



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/889,901	07/24/2001	Larry Y. Yen	MCA-400 PC/U	3005
7590	10/01/2004		EXAMINER MENON, KRISHNAN S	
Mykrolis Corporation 129 Concord Road Billerica, MA 01821-4600			ART UNIT	PAPER NUMBER
			1723	

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	09/889,901	YEN ET AL.	
	Examiner	Art Unit	
	Krishnan S Menon	1723	

S.C.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 2-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

Claims 2-28 are pending in the RCE.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 19, 20, and 22 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over EP 0 299 459 A2.

EP teaches an all perfluorinated thermoplastic hollow fiber membrane cartridge as in instant claims (see fig 5, page 4 lines 35-40, page 5 lines 36-49). Re method of making the cartridge, these claims are product by process, and “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re *Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Even though the reference teaches other thermoplastic materials as useful for making the cartridge (like polyethylene), the preferred material is all thermoplastic fluoropolymer (page 2 lines 32-39, page 4 lines

35-40, page 5 lines 43-48, working examples). The hollow fibers are made using a filler and pore-former, but such additives are completely extracted out leaving only thermoplastic fluoropolymer in the cartridge. EP'459 also teaches potting material as same or different from the material of the hollow fiber in page 7 line 25 – page 8 line 16. With regard to the melt temperature of the potting material, since this the melt temperature is for the purpose of making the hollow fiber bundle, and does not otherwise be a structural limitation, this limitation does not make the claim patentable. EP'459 also covers this limitation in the range of the softening point in page 7 lines 30-35.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-15 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 299 459 A2 in view of Huang et al (US 5,284,584) and Miyagi et al (US 5,114,508).

Claim 28: EP'459 teaches a method of forming an all perfluorinated thermoplastic (page 5 lines 36-48, page 4 lines 35-40; example 5 for all perfluorinated thermoplastic) hollow fiber bundle (abstract) comprising the steps of:

Art Unit: 1723

contacting a plurality of hollow fiber membranes made from one or more thermoplastic resins with one or more molten thermoplastic potting resins to form a substantially parallel array of said membranes (see fig 2-5),  
said one or more potting resins being heated sufficiently above their peak melting point but at or below the peak melting point of the membranes such that they are applied to said membranes at a contact temperature which causes said one or more potting resins streams to flow around said hollow fiber membranes to form a bundle of hollow fiber membranes (page 5 lines 36-48; page 7 line 28 – page 8 line 17) and cooling said bundle (see examples).

EP'549 does not teach reheating the cooled bundle. Huang teaches heating the bundle to a temperature below the peak melting point of the hollow fibers and above the peak melting point of the one or more potting resins for a period sufficient to form a fluid-tight seal between the one or more potting resins and the hollow fiber membranes (col 14 lines 40-55; col 13 line 62-col 14 line 5). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Huang in the teaching of EP'459 to produce a tube-sheet free of gaps and voids at the potted ends as taught by Huang.

Additional limitations of the instant claims are taught by EP'459 in view of Huang as follows:

Claim 2. the peak melting point of the one or more potting resins is at least 5C below that of the hollow fiber membranes. (EP-page 5 lines 36-48)

Claim 3. the peak melting point of the one or more potting resins is at least 10 C below the peak melting point of the hollow fiber membranes, (EP-page 5 lines 36-48)

Claim 4. the one or more thermoplastic, perfluorinated resins of the hollow fiber membranes and the potting resins are selected from the group consisting of homopolymers, copolymers, blends of one or more homopolymers, blends of one or more copolymers and blends of one or more homopolymers and copolymers of perfluorinated resins (EP-page 4 lines 35-40).

Claim 5. the one or more thermoplastic, perfluorinated resins of the hollow fiber membranes and the potting resin are selected from the group consisting of (TFE-co-PFAVE) resins and blends thereof (EP: col 4 lines 35-40).

Claim 6. the bundle is heated to a temperature at or above the peak melting point of the one or more potting resins (page 5 lines 36-48).

Claim 7: the plurality of hollow fiber membranes is formed prior to contacting said membranes with said potting resins by forming said membranes together in a contiguous relation (EP-example 5).

Claim 8. the array is formed prior to contacting said membranes with said potting resins by forming said membranes together in a spaced apart relation (EP-example 5).

Claim 9. the potting resin is a thin stream deposited in a defined zone near one end of said membrane array (Huang-fig 1).

Claim 10. The method further comprising the step of contacting a second thin stream of potting resin near an opposite end of said array of membranes (EP-examples).

Claim 11: The method further comprising the steps of forming a substantially parallel array of said membranes and subsequently spirally winding said array about an axis which is substantially parallel to a longitudinal axis of said membrane array while simultaneously applying said potting resin to the array of membranes to form circular bundle of fibers having at least one potted end. (Huang fig 1; col 4 lines 15-20).

Claim 12. The method of claim 11 further comprising the step of continuing to apply said potting resin after said circular bundle is formed to create a tube sheet of predetermined diameter about at least one end of said hollow fiber membranes. (Huang col 14 lines 25-30; 56-65)

Claim 13. The method further comprising the step of cutting the at least one potted end of the bundle orthogonally to the longitudinal axis of said hollow fiber membranes to form said bundle with at least one flat end surface having exposed lumens (Huang col 9 lines 1-6).

Claim 14. The method of claim 13 further comprising the step of mounting said bundle into a cartridge housing (Huang-col 9 lines 7-10).

Claim 15. The method of claim 14 wherein the bundle is mounted in said housing by fusion bonding (Huang-col 15 lines 4-8)

3. Claims 16-18, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (US 5,284,584) in view of EP 0 299 459 A2 and Miyagi et al (US 5,114,508).

Claim 16: A. method of making a hollow fiber membrane cartridge comprising:

- a. forming a plurality of hollow fiber membranes formed of one or more thermoplastic resins into a substantially parallel arrangement wherein the fibers are arranged in parallel arrangement along a length of the fibers; then
- b. winding the plurality of hollow fibers about an axis which is substantially parallel to the length of the hollow fiber membranes so as to form a bundle having two bundle ends (fig 1; col 4 lines 11-44);
- c. simultaneously with step (b), extruding a molten stream of a thermoplastic resin having a peak melting point at least 5 C below the peak melting point of the hollow fiber membranes (Huang: col 11 lines 20-25) and having a melt flow index of 100 g/10 min (col 4 lines 25-31). or greater and directing said resin onto at least one of the two bundle ends to thereby pot one or more ends in said resin (fig 1);
- d. cooling the bundle;
- e. heating the bundle at the one or more potted ends to a temperature at or above the peak melting point of the resin of the stream but below the peak melting point of the hollow fibers (col 14 lines 48-55); and
- f. exposing the lumen ends of the hollow fiber membranes at one or more potted bundle ends to communicate with the exterior of the bundle (see fig 6)

Huang does not teach specific thermoplastic resin as perfluorinated thermoplastic. EP teaches TFE-co-PFAVE resin for hollow fiber modules (lines 35-40, page 4, examples). Miyagi teaches an all fluorinated resin filter by potting (or sealing) filters using perfluorinated thermoplastic resins (col 5 lines 43-55). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of EP and



Miyagi in the teaching of Huang for obtaining hollow fiber modules with "excellent heat and chemical resistance" as taught by EP and Miyagi (see also Miyagi abstract and col 5 lines 43-55 – temperature resistance).

Re the limitation of "eliminate voids in said potted ends", see Huang col 14 lines 40-55. The process step in lines 48-55 teaches that the molten band, as it is laid on the fabric is solidified, and is melted by re-heating to make the tube sheet, which is fusing the layers of the winding together, or "filling the voids", as claimed

Claim 17. The method of claim 16 wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin (fig 1) (Miyagi col 5 lines 43-55).

Claim 18. The method of claim 16 wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin and wherein both ends of the bundle are exposed so that the lumen ends of the hollow fiber membranes can communicate with the exterior of the bundle (fig 1, col 9 lines 1-6; Miyagi col 5 lines 43-55).

Claim 21. The method of claim 16 further comprising the steps of:  
g. inserting the bundle into a housing for the bundle having a first and second end and a cylindrical housing interior being suitably shaped to contain the membrane bundle, a first means for sealing the first end of the bundle to the interior of the housing adjacent its first end, a second means for sealing the second end of the bundle to the interior of the housing adjacent its second end, the housing having one or more means for dividing

Art Unit: 1723

the bundle into at least two regions including a shell side space exterior to the portion of the bundle between the potted ends and a space including the lumens (fig 4,5,6); then

h. applying a first end cap adjacent the first end of the housing to seal the first housing end; then

i. applying a second end cap adjacent the second housing end so as to seal the second housing end; and

j. providing a shell side access in the housing and at least one access in at least one of the first or second end caps (col 9 lines 7-40; col 15 lines 4-11).

Claim 23. A method according to claim 16 wherein the potting compound has melt flow Index of from about 100 to about 200 g/10 min (col 4 lines 25-30; Miyagi col 5 lines 43-55 – same materials).

4. Claims 24- 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (US 5,284,584) in view of EP 0 299 459 A2 and Miyagi (508) as in claims 16 above, and further in view of Niermeyer (702).

Huang in view of EP does not teach forming a substantially parallel array of hollow fibers, and one or more strips of perfluorinated thermoplastic resin over the array before winding. Niermeyer teaches forming one or more strip of the perfluorinated thermoplastic resin (claim 10) on the array before winding and then potting (col 6 line 24 – col 7 line 11; fig 4). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Niermeyer in the teaching of Huang in view of EP for

easier assembly without forming the fabric of hollow fibers as taught by Huang in view of EP and Miyagi.

Re the element in claim 24, "free of voids", see Huang col 14 lines 40-55.

### ***Response to Arguments***

Applicant's arguments filed 9/13/04 have been fully considered but they are not persuasive.

In response to arguments re the EP'459 ref, that EP patent teaches same material, and therefore, teaches away from claims 19,20 and 22: "Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments" (In re *Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971)). A reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. The question whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis. *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998)

Argument re the Niermeyer ref for claims 20 and 22 are moot, the rejection is withdrawn.

Arguments re the new claim 28 are moot – rejection is different.

In response to the motivation or the desirability for combining the Huang ref with the EP ref and Miyagi ref: the motivation is clearly stated – thermal and chemical resistance. It is granted that Huang does obtain some degree of heat and chemical

resistance using thermoplastic polymers (such as polyethylene or polypropylene). However the degree of resistance obtained by the other references is far superior – temperature resistance much higher because of the higher melting points – see Miyagi col 5 lines 43-55.

In response to the argument that Miyagi teaches a very different process than that taught by Huang, and therefore, unsure that the material used would be compatible: Miyagi teaches potting pleated filters made from perfluorinated thermoplastic media with perfluorinated thermoplastic resins, which is similar in process to the process taught by Huang – potting thermoplastic hollow fibers with thermoplastic resins, and the question of compatibility does not arise.

Question of hindsight: In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

### **Conclusion**

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the

grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, THIS ACTION IS MADE FINAL even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1723

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Krishnan Menon  
Patent Examiner

  
W. L. WALKER  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700